

Urban Decay: Deconstructing Issues In Urban Planning

An Informative VR Experience

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Abstract

Battling the negative effects of urbanization and urban sprawl such as pollution and a lack of public transport access and equality can quickly set current cities on better paths. When these negative side effects of urbanization as well as poor city planning are ignored, the consequences continue to grow with dangerous air pollution from vehicle emissions rising every day and people missing opportunities they may benefit from if the appropriate means of transportation were available. This VR project was developed and exhibited in the CAVE2 Virtual Reality Environment and takes on the United Nations Sustainable Development Goal of Sustainable Cities and Communities by exploring two types of pollution, air and noise, as well as the emphasis on creating more accessible public transportation. Our approach focuses on user interactions involving the CAVE2 wand controller where they can point the built in laser to CO2 clouds to dissipate them, drag and drop letters to replace cars with buses, and water trees decayed by air pollution in order to bring them back.

CCS CONCEPTS • Human-centered computing → Human computer interaction (HCI); Interaction paradigms; Virtual reality

Keywords: Interdisciplinary collaboration, CAVE2, Immersive Environment, Urbanization, Emissions, Transportation

1. INTRODUCTION

Cities all around the world are growing every day with a focus on proper city planning and environmental awareness not being the main focus. [1] Urbanization as well as urban sprawl can have many negative effects on the environment with one of the main issues being pollution. Many cities contain infrastructure that promotes the use of personal vehicles which tends to create a negative feedback loop where car centered infrastructure leads to higher car usage which congests the roads and leads to a higher reliance on car infrastructure with accommodations such as expanding road networks or adding more lanes to existing roads. As more personal vehicles are introduced to the streets, carbon dioxide emissions become more of a threat to not just the environment but also to the people residing in these cities. On top of the negative effects of air pollution, noise pollution also becomes an issue in this kind of infrastructure. Poorly planned cities with large roads placed next to residential or even commercial buildings can have a

negative psychological effect on the city's residents. [2] A lack of public transportation not only makes the previous issues worse as it further pushes people to obtain their own personal vehicles, but it also hinders those who simply cannot get their own vehicle. Not having the appropriate means of transportation can be severely detrimental to many people as it makes it very difficult to not only access basic necessities, but also for employment opportunities. We want to make an environment in our game where these issues can be addressed.



Figure 1: Alleyway scene displaying the dark setting; Figure 2: Typography displaying emotions

2. APPROACH

2.1 Team Overview

In order to tackle this issue and figure out ways to introduce solutions while spreading awareness, we created our VR project, Urban Decay. This project was developed and exhibited in the CAVE2 Virtual Reality Environment with an audience of around 50 members providing feedback and suggestions around project design as well as the general approach to the United Nations Sustainable Development Goal of Sustainable Cities and Communities. Our team consisted of two members, Victor Lopez and Xavier Kania, majoring in Computer Science and Computer Science and Design respectively at the University of Illinois Chicago. Our collaboration process consisted of weekly sessions of brainstorming which took place in person and usually had the highest productivity right after receiving important feedback from Professor Daria Tsoupikova as well as Teaching Assistant Hal Brynteson.

2.2 Implementation

In order to really show the effects of poor city planning, the first step in the project was to create a virtual city in our VR environment in Unity. One design practice we placed a lot of emphasis on in this project was the use of typography to really demonstrate the issue at hand. We wanted to ensure that users felt the negative effects of poor city planning such as packed streets, claustrophobic spaces, and dark and unsettling alleys. Xavier was in charge of the design of these

typographic elements which consisted of words such as “CLAUSTROPHOBIC”, “STRESSFUL”, and “UNCOMFORTABLE”. Another typography puzzle using the CAVE2 controller creates a change in the environment where all the cars on the road are completely removed and instead replaced by a couple of buses showing that many more people can be transported with less clutter on the road which clears both noise and air pollution. Another issue we wanted to address was the issue of littering and overall poor maintenance from the city resulting in garbage riddled alleys and stores. The user is able to drag different types of trash and rubble to the garbage bin which greatly improves the look and feel of the city. Moving forward, the user comes across a barrier warning them of high emissions while locking them inside this alley. As the user nears a large group of trees, a proximity based event is triggered where clouds of CO₂ decay the group of trees. This user interaction gives the user a bucket which can help revitalize the trees showing the effects of inaction on the pollution in the environment as well as the benefits of properly maintaining the environment. Once this is done, the emissions barrier is removed and the user can leave the alleys. The environment is set at nighttime with the environment changing to daytime once the user leaves to show a more positive and bright side of the community once it is cleaned up. After the user’s efforts, a beautiful park becomes accessible showing the shift from urban environments to more walkable and environmentally friendly communities and towns.



Figure 3: The introductory scene, showing the polluted city; Figure 4: The final scene after reducing emissions

2.3 Project Development

While our overall topic was the U.N. Development Goal Sustainable Cities and Communities, our group’s specific scope was on transportation sustainability in urban environments. A large part of the planet’s emissions all come from transportation. Due to current systems most modern-day commuters use a gas powered vehicle everyday to get where they need to be. This has many downsides such as harming local wildlife, and causing health issues for residents in these urban areas. There are many proposed solutions to this, but the primary one we will focus on in this project is making a switch to public transportation. While EV’s are also a common

proposed solution, for clarity in a low-detail VR setting we decided to take the public transportation route. If more people actually used public transportation it would cut down the amount of people in traffic as well as lower emissions by a great degree.

3 PRESENTATION/CONCLUSION

The final display of our work was during our exhibition at UIC's CAVE2 where each group walked through their projects. Talking through all of our hard work was a rewarding experience and creating something that not only informs people of modern-day environmental issues, but also makes you feel like you are experiencing them firsthand was a big accomplishment. Overall we have created an experience that is both immersive and informative and presents a real-life issue in a creative way. And we made sure to maintain a hopeful message, by the end you reduce the city's emissions and are greeted with a daytime setting, serene music, birds chirping, and a city full with nature and low emissions. We hope this project can be a learning experience for those who were unaware of how bad pollution can be in urban areas, and for those who do know we hope it serves as an inspiration to try and make a change because our project demonstrates that your choices make a difference.

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